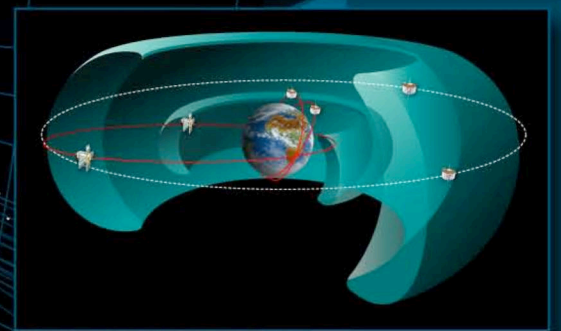
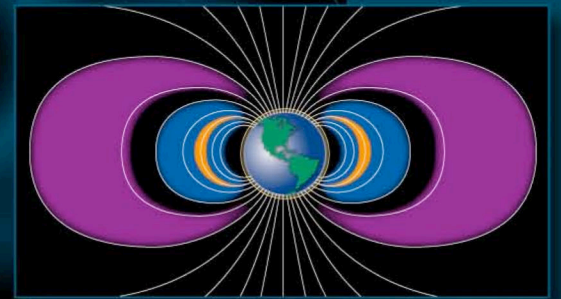
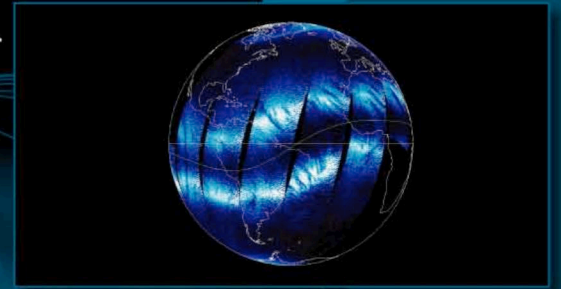


RBSP and GMO AO Highlights NNH05ZDA0030

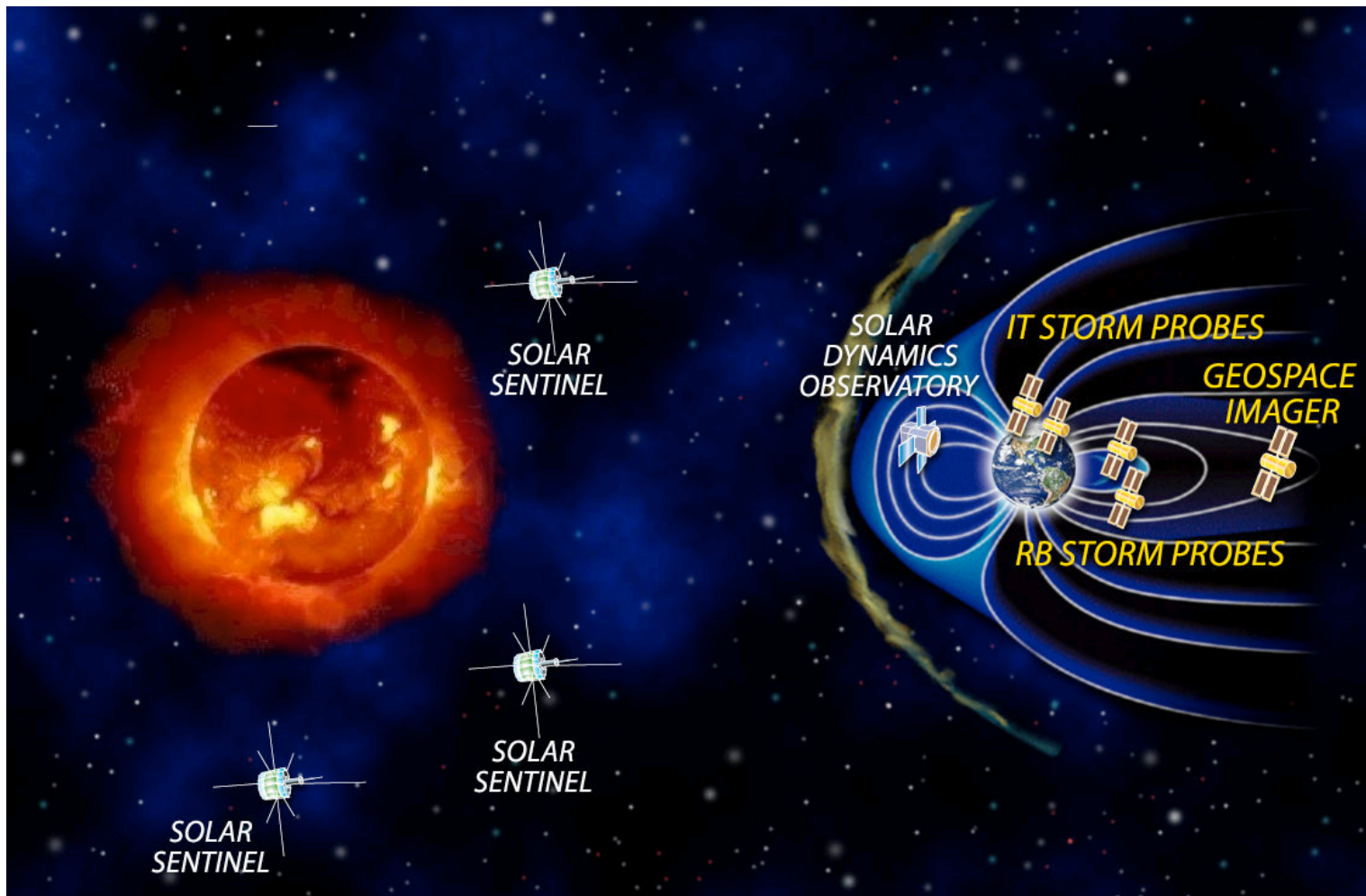
Announcement of Opportunity for the
Radiation Belt Storm Probes
and Geospace-Related Missions of Opportunity

Barbara Giles

LWS Geospace Program Scientist



The Radiation Belt Storm Probes: Role within the Living With a Star Program



Radiation Belt Storm Probes – twin spacecraft in highly elliptical orbits to understand the basic principles behind relativistic particle acceleration, transport, and loss.

Overview of the Mission Development Process

Pre-Formulation

Definition Team - Define science priorities

Concept Studies - Understand feasibility and cost,
set bounds on scope

- Advice to NASA
- Input to the AO

Announcement of Opportunity

Description of the
mission that will be
implemented

Formulation

Phase A - Concept Development

Phase B - Preliminary Design

Approval

Implementation

Phase C - Final Design

Phase D - Fabrication, Assembly, and Test

Operation

Phase E - Operations and Sustainment



Reminder

In case of a conflict between concepts outlined in the Radiation Belt Storm Probes AO and those in the Geospace Missions Definition Team (GMDT) report, the provisions of the Announcement of Opportunity (AO) take precedence.



RBSP AO Objectives

The opportunity is to provide understanding, ideally to the point of predictability, of how populations of relativistic electrons and ions in space are formed or changed in response to the variable inputs of energy from the Sun.

- Of special interest are the controlling mechanisms of particle and field variations responsible for energetic particle acceleration, transport and loss processes.
- Investigations should emphasize understanding of the basic physics of the important processes.

– RBSP and GMO AO: Section 1.1



RBSP AO Objectives

- Investigations should also provide characterization of the energetic particle populations near Earth by determining the average and extreme configurations of the regions under observation and the general character of their response to changing input.
- The space weather effects specifically targeted by the RBSP science objectives are those that affect space assets, astronauts, and flight crews.

– RBSP and GMO AO: Section 1.1



RBSP Science Objectives

Understand the acceleration, global distribution, and variability of energetic electrons and ions in the inner magnetosphere

More specifically, the Radiation Belt Storm Probes prime objective will be fulfilled by meeting these prioritized specific objectives:

1. differentiating among competing processes affecting the acceleration and transport of radiation particles;
2. differentiating among competing processes affecting the precipitation and loss of radiation particles;
3. understanding the creation and decay of new radiation belts;
4. quantifying the relative contribution of adiabatic and nonadiabatic processes on energetic particles;
5. understanding the role of "seed" or source populations for relativistic particle events;
6. understanding the effects of the ring current and other storm phenomena on radiation electrons and ions;
7. understanding how and why the ring current and associated phenomena vary during storms; and
8. developing and validating specification models of the radiation belts for solar cycle time scales.

– RBSP and GMO AO: Section 2



Missions of Opportunity

- This AO also invites proposals for Missions of Opportunity that effectively fulfill LWS Geospace specific objectives through an investigation that is carried on a mission sponsored by an organization(s) other than NASA's Science Mission Directorate.

– *RBSP and GMO AO: Section 1.1*

- NASA LWS Geospace program may select and fund a MO investigation if it is clear that the investigation could be regarded as part of the LWS Geospace Program.

(for evaluation purposes, the GMDT report will be used to define the Geospace Program)

- Also, a MO may be selected if it could significantly augment the LWS RBSP mission objectives as judged by peer review and the NASA LWS staff and that its support by NASA would be advantageous to the LWS Program.

– *RBSP and GMO AO: Section 5.10.1*

See the RBSP and GMO AO library at <http://rbsp.larc.nasa.gov/rbsp/lib.html> for information on how to access the definition team report: *The LWS Geospace Storm Investigations: Exploring the Extremes of Space Weather*.



More on the Mission of Opportunity (MO)

- It is incumbent on the proposing investigator to provide evidence in their proposal that the sponsoring organization intends to fund the mission and state when the endorsement of NASA for U.S. participation is required.
- The operational phase of a MO must include a reasonable and meaningful overlap with planned LWS Geospace missions operation phase.
(NASA will use the 2005 SSSC Roadmap to guide this evaluation)
- If selected, a LWS Geospace-related MO will be conducted on a no-exchange-of-funds basis between NASA SMD and the mission sponsor, including other parts of NASA.
- Like other investigations proposed to this AO, the NASA funding for a MO is subject to termination if there is a cost overrun charged to NASA for any reason, including a launch delay caused by the non-NASA SMD partner.
- The PI assumes all risk for delays in the mission and must propose appropriate reserves

– *RBSP and GMO AO: Section 5.10*



Specific Provisions for Proposals

- This AO solicits proposals for RBSP scientific investigations from individual Principal Investigators (PIs), aided by a science team consisting of an appropriate and justified number of Co-Investigators (Co-Is) and/or participating scientists.

– *RBSP and GMO AO: Section 1.3, Appendix B, Section D.5.d*

- Proposed investigations must provide identical pairs of individual instruments or identical pairs of various combined sets (i.e., suites) of instruments up to and including an entire complement of integrated instruments sufficient to satisfy all the science objectives of the entire mission.

– *RBSP and GMO AO: Section 1.3*



Requirements and Constraints

- In the case of investigations that propose to provide suites of instruments, the scientific merit; the scientific implementation merit; including technical merit; and the technical, management, and cost (TMC) of each instrument will be evaluated in addition to the overall suite.
- Composite suites, as well as their individual instruments, will be categorized separately in order to give NASA the greatest flexibility in assembling the most scientifically and technically satisfactory and cost effective payload possible.
- Therefore, proposers of instrument suites must indicate the scientific return and cost of each instrument and the cost of the entire suite.

– *RBSP and GMO AO: Section 1.3*



RBSP and GMO AO Solicitation Elements

This AO solicits proposals to provide **complete scientific research investigations** led by a single Principal Investigator (PI) and aided by an appropriate and justified number of Co-Investigators. Proposals must include each of the following elements:

- **development of a science research plan** that addresses one or more of the science objectives and societal effects goals as described in Section 2 of this AO;
- design, development, and delivery to NASA of **flight experiment hardware** in the form of two identical instruments (or two identical suites of instruments) or, for Mission(s) of Opportunity, delivery of a flight experiment to the mission sponsor, see further below;
- **active participation** in mission integration, science mission planning, and operation of the proposed instrumentation;

– *RBSP and GMO AO: Section 1.1*



AO Solicitation Elements - continued

- development of a data acquisition, calibration, processing, distribution, and archiving plan to provide **one or more complete sets of measurements** sufficient to address the proposed research plan and that are suitable for integration into Sun-Solar System Connection Research and Analysis (R&A) Program efforts for the purpose of supporting science understanding studies, characterization studies of the space environment, and studies to enable the prediction of potentially hazardous space weather effects;
- design and development of **hardware and software to support the data acquisition, calibration, analysis and processing, distribution, and archiving plan**;
- **provision in near real time of selected space weather prediction data** products of utility to NASA, National Oceanic and Atmospheric Administration (NOAA) and, potentially, other space environment effect prediction communities;

– *RBSP and GMO AO: Section 1.1*



AO Solicitation Elements - continued

- **timely execution** of the data acquisition, calibration, processing, distribution, and archiving of the proposed data products; and
- **analysis and timely publication** in the peer reviewed literature of research based on the integrated data sets that address the objectives described in Section 2 of this AO.

– *RBSP and GMO AO: Section 1.1*

Proposals must identify a **minimum acceptable data and scientific return for the investigation** (the Minimum Science Investigation), below which the investigation would not be worth pursuing. The value of the Minimum Science Investigation must be discussed.

– *RBSP and GMO AO: Section 5.7, Appendix B Section D.4*



Near-Real Time Data Access

- Proposal shall identify the near real-time space weather quality data products that may be deemed useful to space weather operation centers for space weather forecasting and monitoring.
- The LWS Geospace SWG will finalize a coordinated list of products that the investigators will be responsible to make publicly available via a spacecraft real-time transmitter and, if deemed desirable, again within minutes after receipt of the full RBSP data stream by the PI teams.

– *RBSP and GMO AO: Section 1.1, Section 5.4.5, Section 5.11*



Important Dates for Proposers

AO release	August 23, 2005
Pre-proposal Conference	September 9, 2005
Notice of Intent to Propose due	September 27, 2005
Proposal submittal due by 4 p.m. ET including all letters of endorsement	November 22, 2005
Selections for Phase A (Target)	February, 2006
Instrument Phase A start (Target)	March, 2006

– *RBSP and GMO AO: Section 4*



Available NASA Funding

NASA's resources available for this program are constrained

- **The total cost to NASA of all RBSP investigations selected through this AO is approximately \$61M in real year dollars.**
- In addition, up to \$47M in real year dollars is available for the LWS Geospace-Related Mission of Opportunity.
- In any event, the continuation of any aspect of this program shall be contingent upon the availability of appropriate NASA funding through the yearly U.S. Federal Government budget process.

– *RBSP and GMO AO: Section 1.2*

NASA reserves the right to select only a portion of a proposer's investigation and/or to invite his/her participation with other investigators in a joint investigation.

– *RBSP and GMO AO: Section 7.3*

NASA reserves the right not to make a selection, regardless of the categorization results, or cancel this AO at any time.

– *RBSP and GMO AO: Section 7.3*



Phase A Funding

- Each investigation team selected through this AO will conduct a Phase A concept study, the cost of which must be part of the proposal and must be included in the NASA SMD cost estimate.
- It is anticipated that Phase A funding for a particular investigation will depend on the size and complexity of the proposed work.
- Total resource available for all Phase A RBSP Investigations: ~\$3M
- Total resource available for all Phase A MO Investigations: ~\$1M
- NASA reserves the right to make partial selections of investigations
- NASA reserves the right to make tentative selections pending the outcome of Phase A studies. More than one instrument of the same type may be selected for Phase A studies. A review will be held to decide which investigations continue into Phase B.

– *RBSP and GMO AO: Section 1.2, Section 1.4, Section 5.8.4*

Reserve Policy

- Investigations must plan to maintain a reserve through the end of Phase B of **at least 25 percent** of all costs through the end of Phase D.
- A cost reserve for Phase E must also be included as appropriate.
- Proposers should not assume that the RBSP Project Office will maintain any reserves beyond those proposed.

– RBSP and GMO AO: Section 1.4

Formulation

Phase A - Concept Development

Phase B - Preliminary Design

Approval

Implementation

Phase C - Final Design

Phase D - Fabrication, Assembly, and Test

Operation

Phase E - Operations and Sustainment

Must have appropriate
reserves to begin
implementation phase



Maximum Payload Resources

Table 5.2 Maximum Payload Resources for each Spacecraft*

	Estimate Mass [kg]	Operational Power [W]	Peak Power [W]	Survival Power [W]	Data Rate** Orbit Average [kbps]	Data Rate Burst [kbps]
Totals	67	27	40	10	9.4	64

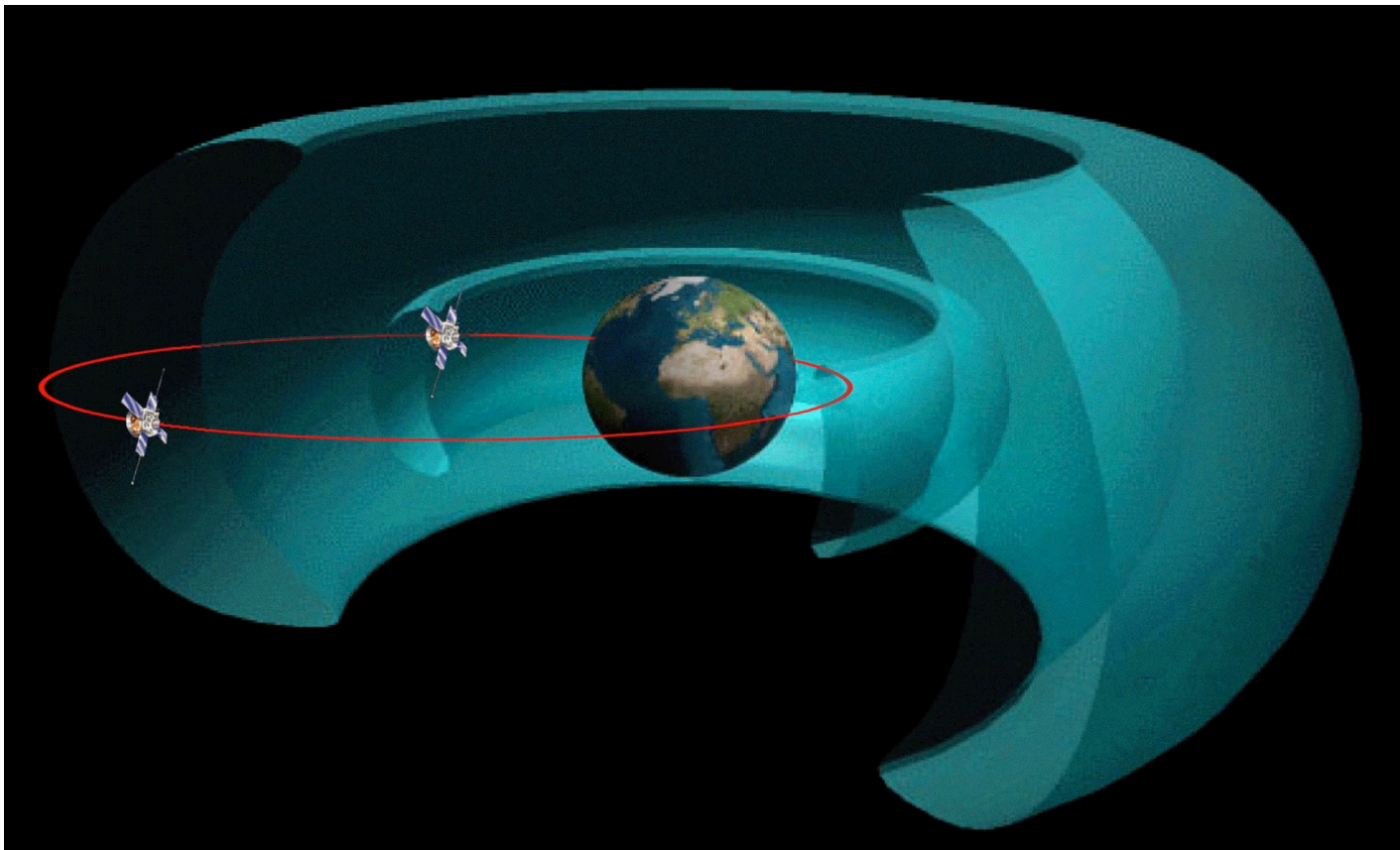
* Inclusive of all margins and reserves

** Includes CCSDS Packet Headers (Section 5.3.4)

– RBSP and GMO AO: Section 5.2.2

- Table 5.2 represents maximum resource envelope for the *entire* scientific payload.
- Proposals may reflect changes to the concept payload, concept spacecraft interfaces, or other spacecraft characteristics as necessary in order to achieve their proposed science goals.

RB Storm Probes Mission



Initial velocity difference between the spacecraft will be sufficient for the leading spacecraft to lap the lagging spacecraft several times during the mission allowing spatial and temporal measurements to be performed at separation times and distances that vary with mission duration.

– *RBSP and GMO AO: Section 5.2.1*



Special Considerations

Spacecraft Orientation:

- A critical parameter in designing instrumentation for the Radiation Belt Storm Probes (RBSP) mission is the angle "alpha" between the spacecraft spin axis and the local, instantaneous magnetic field vector.
- The angle alpha will depend on a variety of factors including Earth's orientation with respect to the Sun, spacecraft orbit orientation, the tilt of the Earth's magnetic axis, the instantaneous position of the spacecraft within its orbital trajectory, and magnetic storm-time distortions of the magnetic field configuration.
- Proposals must provide analysis that demonstrates how the proposed concept for sensors will successfully achieve the goals of the proposed investigation for the potentially broad alpha-angle distribution over the mission lifetime.

– *RBSP and GMO AO: Section 5.2*

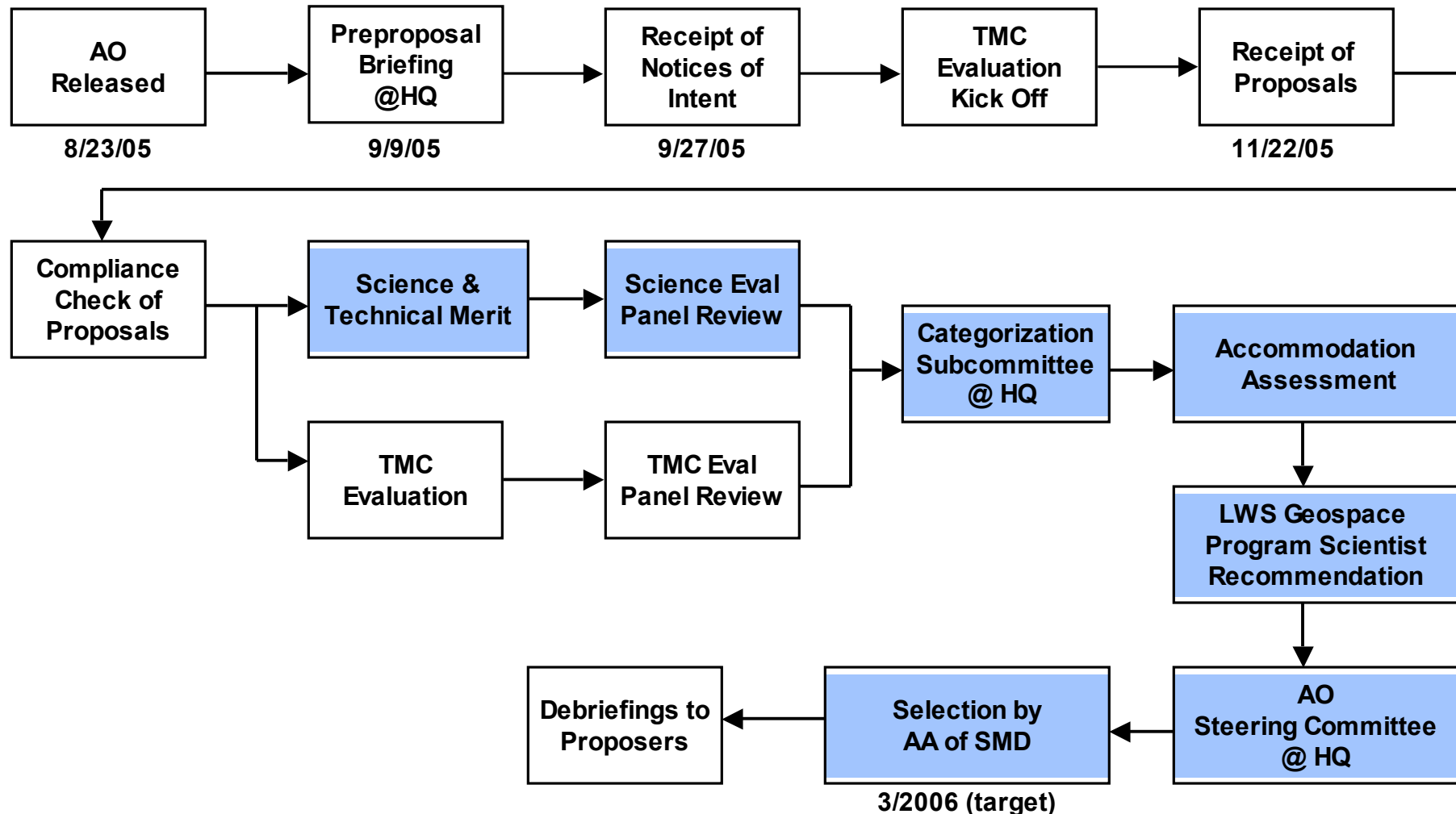
Space Environment:

- Proposals must provide analysis and a concept for sensors and electronic components, including margin, that demonstrates instrument compatibility and robustness with respect to the mission environment.

– *RBSP and GMO AO: Section 5.2, Appendix B, Section D.5.e*

See, in particular, the separate presentation on the spacecraft environment at this preproposal conference

Overview of the Evaluation, Categorization, and Selection Process





Decision Points

Successful proposals to this AO will be selected through a single-step process for a Phase A study only, with options for further Phases.

- **Selection**: This selection will be guided by categorization based on peer reviews of Science Merit; Scientific Implementation Merit; and Technical, Management, and Cost (TMC).
- **Potential Downselects**: The choice of investigation teams to continue into Phase B will be made by the Associate Administrator for the Space Mission Directorate based upon review of the Phase A concept studies and programmatic considerations.
- **Phase A/B transition**: The end of Phase A and the transition to Phase B is marked by an Initial Confirmation Review with the Associate Administrator (AA) for the Science Mission Directorate (SMD).
- **Phase B/C transition**: Approval to proceed into implementation requires successful completion of a full Confirmation Review with the SMD AA.

– *RBSP and GMO AO: Section 1.3, Section 1.4*



Evaluation, Categorization, Selection

- Successful proposals to this AO will be selected through a single-step process for a Phase A study only, with options for further Phases.
- NASA reserves the right to make partial selections of investigations.
- In addition, NASA reserves the right to make tentative selections pending the outcome of Phase A studies.
- More than one instrument of the same type may be selected for Phase A studies. In this case, at the end of the Phase A studies, a review will be held to decide which investigations continue into Phase B. The option on contracts of those not selected to continue will not be executed.

– RBSP and GMO AO: Section 1.4, Appendix A, Section II

Evaluation Criteria

- The fundamental aim is to identify scientific ideas and unique instrumental capabilities that together optimally address the overall scientific objectives of the RBSP mission.
- The evaluation criteria below will be used to evaluate and categorize proposals.
- For a Mission of Opportunity, only the proposed investigation will be evaluated.

Criteria	Weight
Scientific Merit	40%
Scientific Implementation Merit	30%
Technical, Management, Cost (TMC)	30%

– RBSP and GMO AO: Section 7.2



Scientific Merit (40%)

- The **goals and objectives of the proposed investigation** will be assessed to determine the potential of the investigation to achieve one or more of the RBSP specific science objectives and the potential to impact characterization and predictability of the space weather effects.
- The **relevance of the proposed investigation**, as it applies to the specific opportunity described in this AO, will be assessed along with its perceived scientific value considering the investigation resources required and mission resources available.
- A major element in this assessment will be **whether the data that are proposed to be gathered will be sufficient** to complete the proposed investigation and are suitable for integration into the LWS Targeted Research and Modeling Program efforts for the purpose of supporting science understanding studies, characterization studies of the near-space environments, and the prediction of potential hazardous space weather effects.
- The **scientific value of the Minimum Science Investigation** will also be assessed as part of the determination of the overall scientific merit of the investigation.

– RBSP and GMO AO: Section 7.2.2



Scientific Implementation Merit (30%)

- Each proposed investigation will be evaluated for its **scientific implementation and technical merits** as a measure of the probability of success of the proposed hardware to supply the data needed to successfully achieve the goals of the proposed investigation and to contribute to the success of the RBSP mission.
- This evaluation will consider the **relationship between the proposed scientific objectives, the data to be returned, and scientific implementation** to be used in carrying out the investigation.
- Scientific implementation merit will be evaluated by assessing
 - the degree to which the proposed instrument(s) will support the **accomplishment of the proposed investigation** and
 - the degree to which the proposed instrument(s) can **provide the necessary data** using the proposed technologies, as well as
 - the degree to which the **mission will support the accomplishment of acquisition of the required data.**

– *RBSP and GMO AO: Section 7.2.3*

Scientific Implementation Merit (30%) - continued

- Areas requiring **critical technology development** of the instrument for flight readiness shall be identified.
- Should a **new technology** that represents an untested advance in the state of the art be proposed for use, an assessment will be made of the likelihood of its scientific success.
- Other major elements of this criterion include the **proposed data analysis and archiving plan** and the proposed plan for the timely release of the data to the public domain.
- The **probability of success** will be evaluated by assessing science team roles, experience, expertise, and the organizational structure of the science team and the technical merit associated with the overall investigation design and/or instrument set.
- The **role of each Co-Investigator** will be evaluated for necessary contributions to the proposed investigation.

– RBSP and GMO AO: Section 7.2.3

Technical, Management, Cost (TMC) (30%)

- The soundness of the technical and management implementation approach, schedule, and cost realism and reasonableness will be the primary factors considered in determining the Technical, Management, and Cost (TMC) Risk.

– *RBSP and GMO AO: Section 7.2.4*

See, in particular, the separate presentation on this
Evaluation Criteria at this preproposal conference

Symposium on Management of NASA Science Projects

DATE: September 30, 2005
LOCATION: University of California, Berkeley
TO ATTEND: Inform samtiam@ssl.berkeley.edu

PURPOSE: To discuss management of science instrument and payload fabrication projects from the perspectives of scientists, engineers, Universities, and NASA. NASA has undergone a critical shift in its mission management strategy relating to safe and reliable operations. This symposium will help instrument and mission proposers understand NASA's revised management strategy and will help NASA understand problems that small research groups have complying with this strategy.

“Principles Of Project Management”

Professor Andrew Isaacs of the Haas School of Business at Berkeley

“Project Management From The NASA Headquarters Perspective”

Dr. Charles Gay, Chief of Flight Programs for the Earth-Sun System (tentative)

“Project Management From The Perspective Of A Proposal Reviewer”

Beth Wahl, NASA consultant on proposal reviews

“Project Management From The Perspective Of A Project Manager”

Mr. Steve Battel, NASA consultant; Former manager of the EUVE project

“Project Management From The University Perspective”

Professor Bob Lin, Director of the Space Sciences Laboratory, Berkeley

Round Table Discussion and Questions

INFORMATION: <http://sprg.ssl.berkeley.edu/index/html>

Categorization

A Categorization Committee, composed wholly of Civil Servants, will convene to consider the peer review results and categorize the proposals in accordance with the NASA FAR Supplement (NFS) Part 1872. **Categorization determines the competitive range by determining which proposals are selectable.**

Category I	Well conceived and scientifically and technically sound investigations pertinent to the goals of the program and the AO's objectives and offered by a competent investigator from an institution capable of supplying the necessary support to ensure that any essential flight hardware or other support can be delivered on time and that data can be properly reduced, analyzed, interpreted, and published in a reasonable time. Investigations in Category I are recommended for acceptance and normally will be displaced only by other Category I investigations.
Category II	Well-conceived and scientifically or technically sound investigations that are recommended for acceptance, but at a lower priority than Category I.
Category III	Scientifically or technically sound investigations which require further development. Category III investigations may be funded for development and may be reconsidered at a later time for the same or other opportunities.
Category IV	Proposed investigations which are recommended for rejection for the particular opportunity under consideration, whatever the reason.

– *RBSP and GMO AO: Section 7.1*



Accommodation

- After categorization, the Program Scientist may request a payload accommodation assessment of the highly ranked proposals to aid in developing a recommendation for selection of an integrated science payload.
- The accommodation study will be led by the LWS Program Office and may involve the participation of the mission prime contractor.
- The accommodation assessment may include Category I, II, and III investigations.

– *RBSP and GMO AO: Section 7.1*



Selection

- The selection process is a NASA Headquarters function.
- The results of the evaluations and categorizations and the recommendation for selection of investigations will be presented by the LWS Geospace Program Scientist to the AO Steering Committee, which is composed wholly of NASA Civil Servants and appointed by the Deputy Associate Administrator for the Science Mission Directorate.
- The AO Steering Committee will conduct an independent assessment of the evaluation and categorization processes regarding both their compliance to established policies and practices, as well as the completeness, self-consistency, and adequacy of all materials related thereto.
- After this review, the final evaluation and categorization results will be forwarded to the Associate Administrator for the Science Mission Directorate who is the Selection Official for this solicitation.

– *RBSP and GMO AO: Section 7.1 Section 7.3*



Selection Continued

- The results of the proposal evaluations and categorizations for selectable proposals will be considered in the selection process along with a variety of other programmatic factors.
- These programmatic include, but are not limited to, the most current Administration policies and budgets, as well as the evolving scientific priorities identified by the scientific community.
- The overriding consideration for the final selection of proposals submitted in response to this AO will be to maximize the scientific return of the entire mission within the available budget.
 - depending on the availability of proposals of appropriate merit, this may be achieved by a combination of investigations from Category I, II, or III to form a complete payload within the cost ceiling.
- For selection, the proposed cost to NASA SMD will be invoked to help discriminate between closely competing proposals.

– *RBSP and GMO AO: Section 7.1 Section 7.3*



IDS and SWG

- It is the intent of NASA to separately, in a future announcement, solicit Interdisciplinary Science (IDS) proposals to conduct additional science analyses that address cross-disciplinary LWS science themes and that several IDS principal investigators (PIs) will be selected no earlier than 2008.

– *RBSP and GMO AO: Section 1.4*

- LWS Geospace Science Working Group (SWG) will be established and will be composed of the Principal Investigators from the RBSP mission and other LWS Geospace missions.
- The SWG may also include several Interdisciplinary Scientists who will be competitively selected through a separate solicitation after the RBSP science investigations are known.
- The purpose of the SWG will be to maximize scientific return within the existing resources.

– *RBSP and GMO AO: Section 5.6.4*



International Participation

- Participation by non-U.S. individuals and organizations is encouraged on the basis of no exchange of funds. However, since such participation can add to management complexity and, therefore, risk, proposed cooperative arrangements
 - **should offer significant benefits**
 - **while maintaining clear technical and management interfaces.**
- Note that any proposed international participation must be described in the same level of detail as that of a U.S. proposed investigation, to the maximum extent possible.
- NASA will seek to validate contribution costs, schedule, and management data during evaluation of the proposals and in subsequent reviews.
- Failure to provide such information about proposed contributions, or failure to document the commitment of all team partners to those costs and schedules, may cause a proposal to be found unacceptable for selection through this AO.

– *RBSP and GMO AO: Section 5.9*

See, in particular, the separate presentation on
International Partnerships at this preproposal conference



Export Laws and Regulations

Foreign proposals and proposals including foreign participation must include a section discussing compliance with U.S. export laws and regulations.

– RBSP and GMO AO: Section 5.9.3

See, in particular, the separate presentation on Export Control Regulations at this preproposal conference

Access to Information

- The AO and the AO amendments are accessible at <http://nspires.nasaprs.com>
- Announcements are also posted to the AGU SPA Newsletter and to the Solar Newsletter
- An acquisition web site has been established: <http://rbsp.larc.nasa.gov/>
 - Link to the AO
 - Information from this Preproposal Conference including all presentations
 - Question and Answers
 - Archive of Announcements
 - List of those interested in teaming
- Direct questions to: Dr. Barbara L. Giles
E-mail: barbara.giles@nasa.gov
Subject line: LWS RBSP AO

Teaming Interest

<http://rbsp.larc.nasa.gov/rbspsteaming.html>



RBSP Acquisition

+Home

RBSP AO Library

Preproposal Conf Info

Questions & Answers

Teaming Interest

RADIATION BELT STORM PROBES INVESTIGATION

TEAMING INTEREST

The following list of organizations have expressed an interest in teaming with other organizations on RBSP proposals. This is not a list of organizations who are capable of teaming but is simply a list of those organizations that have ask to be included in this list. Proposing organizations are not required to team with any organization on this list. NASA does not endorse any of these organizations and does not accept responsibility for their capabilities or actions.

If you would like to include your Organization and name on this list [Click Here](#).

[RBSP Teaming Interest Organizations](#)